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ABSTRACT

Seychelles Integrated Science (SIS), a 3-year laboratory-based science program for students (ages 11-15) in upper primary grades 7, 8, and 9, was developed from an extensive evaluation and modification of previous P7-P9 materials. This P9 SIS unit deals with conserving health, focusing on such body processes as breathing, digestion, excretion, circulation, and nervous coordination. Other areas examined include the importance of diet and exercise, damage done to the body by smoking, and the effects of alcohol on the body. In addition, the fact that people may have different interpretations of the same observation is explored. Provided for the unit is a student workbook and a set of teaching notes. The teaching notes include the general aims of the unit, and a lesson plan for each topic area. Each lesson plan includes a suggested time frame, a list of objectives, a list of equipment needed, and a suggested lesson format. This format includes suggestions for introducing the lesson, instructional strategies (emphasizing procedures for student activities), and evaluation methods. The student workbook includes procedures for completing the unit activities and a list of new words keyed to page numbers in the workbook. (JN)

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seychelles integrated science

Unit 12

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TEACHING NOTES

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The Goals of Unit 12

This unit deals with conserving our health. We have already looked at reproduction in Unit 6, here we take a close look at the other body processes - breathing, digestion, excretion, circulation and nervous coordination.

You will find that unlike many old-fashioned courses we place very little emphasis on the pupils labelling and identifying the various parts of the human organs. At P 9 level it is NOT important for children to be able to draw, label and identify specific things such as alveoli, the malleus, the incus or the cilary muscle. Rather we want the pupils to know and understand simple ideas and concepts on how the various parts of their bodies work and be able to use this knowledge to help them to avoid infection, damage and disease and thus conserve their health.

The unit has five main goals, therefore ;

(1) To help the pupils understand the functioning and purposes of important body processes, especially breathing, digestion, excretion, circulation and nervous coordination.

(2) To make the pupils aware of the importance of diet and exercise for maintaining a healthy body.

(3) To make the pupils aware of the damage that may be done to their health by smoking.

(4) To make the pupils aware of the effect that alcohol may have on their body's reactions and some possible consequences of this.

(5) To make the pupils aware that people may have different interpretations of the same observation.

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Lesson Plan

Unit 12 Topic 1

Breathing and Health

Time We suggest that this Topic should take at least three periods.

Objectives At the end of the Topic the pupils should ;

(1) be able to identify where the lungs are in the body and know that when we breathe we 'fill' our lungs with air.

(2) know that a person's fitness will be affected by lack of exercise and by smoking cigarettes.

(3) know that smoking is bad for our health because tar and smoke can irritate and damage the lungs and may cause diseases such as cancer and bronchitis.

(4) be able to explain in their own words that in order to breath in we push out our ribs and lower our diaphragm muscle ; this increases the volume inside our chest and air rushes in.

(5) be able to explain in their own words that when we exercise we increase our breathing rate so that we can take in more air to help us respire faster.

(6) be able to explain in their own words that after we stop exercising, it will take some time for our breathing rate to return to normal. The fitter a person is, the quicker his/her rate returns to normal.

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Equipment

1.1 each pair of pupils will need a piece of thread or string about 1.5 m long.

1.2 you should try to make the model as shown in the diagram. For this you will require, a bell-jar, a one-holed rubber bung, a Y tube, glass tubing, balloons, a rubber sheet (or plastic bag) and either string or a strong rubber band. If you do not have a Y tube make the model with one balloon only.

1.3 you will need a clock with a second hand or as many watches with second hands as you can manage.

1.8 a cigarette, some cotton wool and glass tubing (or a thermometer case), rubber tubing and a vacuum pump may also be used, depending on the demonstration method you choose.

Suggested Lesson Plan

Introduction

Get one pupil to jump up and down on the spot for 50 times. When the pupil stops get the rest of the class to listen quietly. Ask them what they can hear. Then ask the pupils to explain - what is happening when the pupil breathes (objective 1).

Activity

Let the pupils carry out activity 1.1. Ask individuals to explain to you what they feel. Emphasize that as they breath in, their ribs move out to let their chests expand. Get the pupils to work in pairs to measure each other's chest expansion (i.e. the difference between their 'deflated' and 'expanded' chest). Let them record their results in their books.

Demonstrate to the class the lung model. Show how the lungs (balloons) expand as the volume or size of the chest or lung cavity is increased. Explain how we increase the size of our lung cavity by lowering our diaphragm @ by 'pushing' out our ribs. Show what

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happens to the air in the model lungs when we relax the diaphragm. Ask the pupils to explain how we breathe out (Objective 4).

Let the pupils read section 1.3, 1.4 and 1.5. The in groups of 4 or 5 get them to discuss what they are going to do. Select a spokesman from one or two of the groups to explain to the class what their group intends to do and ask the class to judge if he/she is correct. Let the pupils carry out the activity and let them record their results as they do so. Make sure everyone records their breathing rate for at least 5 minutes after they have stopped exercising. Let one person from each group write on the board their group members' breathing rates before and immediately after exercise and the number of minutes it took for their rate to come back to normal. Without embarassing any of the children try to see if the class athletes return to normal quickest and if those who are "least active" or are known smokers take longest. (objective 2,5 and 6)

Ask the pupils to discuss in groups why they think some people are fit and others are unfit (Objective 2)
Ask the pupils to suggest reasons why they think smoking can affect our fitness.

Set up activity 1.8. You can either get the technician to smoke the cigarette through the tubing or else connect the tubing to a vacuum pump. (If possible repeat the experiment with a second and third cigarette). Take out the cotton wool and let the pupils see and smell the tar and smoke absorbed by the wool.

Discussion and Evaluation

At this stage you may like to let the pupils read and discuss the leaflet "Lets Talk About Smoking". The Family Life teacher in your school will have a clas t which you can borrow. Discuss with the pupils the risk smokers run of getting lung cancer and bronchitis.

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To help illustrate this you can discuss the statistic that two out of every five smokers will die before they are 65, whereas only one out of every five non-smokers will die. Ask five pupils to stand up as "smokers" and five as "non-smokers" and get 2 from the smokers and one from the non-smokers to drop down dead. Repeat with ten smokers and non-smokers (objective 3).

Check the pupils' understanding of the objectives by, for example, asking individuals to explain ;

"What should a person do to try and get fit ?" , and

"Why is smoking bad ? What can it do to harm us ?"

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Lesson Plan

Unit 12 Topic 2

Circulation in Your Body

Time We suggest that this Topic should take three to four periods

Objectives At the end of the Topic the pupils should

(1) be able to show the position of their own or anyone else's heart and know that the heart pumps blood around the body.

(2) know that the pulse rate is a measure of the heart beat.

(3) know that the pulse rate and heart beat increase during and after exercise.

(4) know that our blood receives oxygen from the lungs and gives out excess carbon dioxide to the lungs.

(5) be able to explain in their own words that blood leaves the heart and travels around the body in arteries and returns from the body to the heart in veins.

(6) be able to feel and measure their own and anyone else's pulse rate.

(7) be able to explain in their own words and be able to draw a simple diagram to illustrate that in the circulation of blood the right hand side of the heart pumps blood to the lungs and that "oxygen rich" blood returns to the left hand side of the heart and is then pumped to the rest of the body before returning to the right hand side of the heart.

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(8) know that many people in Seychelles die from diseases of the heart and cirulatory system and that these diseases are due in part to lack of exercise and overeating and smoking.

Equipment

Each pair or group of pupils will need

2.1 a plastic filter funnel (the neck of a squash bottle may be cut to make a funnel), and about 50 cm of rubber tubing.
They should also have acess to a watch or clock with a seconds counter.

2.8 some plasticene - two colours per group.

Suggested Lesson Format

Introduction

Ask the pupils if anyone has been to visit the doctor within the past few weeks. Ask them what a doctor usually does when he/she examines a patient. Get the pupils to describe the stethoscope the doctor uses - what it looks like and whet he uses it for. Tell the pupils that today they are going to make a stethoscope.

Activity

Show the children how to assemble the filter funnel and tubing. The allow them to carry out activities 2.1, 2.2 and 2.3.
Write a few questions on the board and allow the pupils a few minutes to discuss these and prepare verbal answers. Questions such as,
"What was it that was making the noise ?"
"If that noise stopped we would die - why ?"

Allow each group some time to report their answers to the class. In the discussion bring out objectives 1, 2 and 3 - and if possible 4.

Allow the pupils a few minutes to read and look at 2.8. You can allow the pupils to simulate - or act out - the circulation of the blood. Two heavy boys can

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act as the right and left sides of the heart. A boy or girl with a fan can act as the lungs and other boys and girls at desks can act as the organs and muscles. Pupils carrying books will then become the cells or "little bits" of blood carrying "red" oxygen books and "blue" carbon dioxide books around the circulation.

When you are satisfied that the pupils have achieved objectives 4,5 and the explanation of 7 allow them to make the plasticene model and then let them draw a diagram of the circulatory system into their books.

Discussion and Evaluation

Much of the discussion and evaluation for this Topic will be carried out during and after the individual activities. At this stage you should spend some time allowing the pupils to talk about and describe any relatives or friends who have "heart trouble". We are not trying to get the pupils to understand the details of heart attacks and high blood pressure etc, but simply want them to know that heart diseases are in part due to the lack of exercise, overeating and smoking (objective 8).

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Lesson Plan

Unit 12 Topic 3

Looking at Your Blood

Time A double period

Objectives At the end of the Topic the pupils should

(1) know that our blood is made up of red cells, white cells, platelets and plasma, and that
   (a) red cells carry oxygen from our lungs to our muscles and other parts of the body
   (b) white cells help fight disease (or germs) which invade our body
   (c) platelets help to clot the blood
   (d) the plasma is the liquid part of the blood and contains dissolved food and waste.

(2) be able to take a sample of their own and of other peoples' blood and make a blood slide.

(3) be able to explain in their own words that anaemia is a blood disease which is common in Seychelles and that people who have anaemia do not have enough red blood cells. Sometimes this is because they do not eat enough foods with iron in them, foods such as fish, beef, beans, pumpkin, sweet potato and green leafy vegetables.

Equipment Each group of pupils will need

-- a microscope and slide
-- a thread or elastic band
-- a sharp needle or pin

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The pupils should also have access to

--- some methylated spirit and cotton wool to sterilize their thumb

--- a flame to sterilize the needle

Suggested Lesson Format

Introduction

Give a brief revision of the last Topic discussing the heart and what it does. Emphasize the heart's role as a pump in circulating the blood. Then ask some of the pupils to describe what blood looks like. Ask if anyone has every smelt or tasted blood and then ask them to describe the smell/taste. If the pupils have difficulty in thinking of the taste of blood, ask if anyone likes black pudding (boudin) - explain that black pudding is made from dried blood.

Tell the pupils that today they are going to look at their own blood under the microscope. Demonstrate how to take a blood sample. Point out that they need to wipe their thumb with methylated spirit and sterilize the needle to kill any germs. Emphasize that once they get the blood sample they must look at it under the microscope as quickly as possible.

The pupils may find it difficult to "see" anything under the microscope. You and the technician should move from group to group and where needed help to focus the microscope and identify the cells. The pupils will probably only be able to see the red cells and plasma.

Discussion and Evaluation

As you move from group to group check that they can carry out the activity (objective 2) and discuss with them what they can see and what they think the

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functions of the red cells and plasma are. Describe a white cell and its function and ask the pupils to see if they can find one.

Ask the pupils to look at their thumb and say what has happened to their wound. From this explain that the platelets help the blood to "dry up" or clot.

After the activity discuss with the pupils the four parts of the blood - what each looks like and its main function (s) - objective 1

Ask the pupils to discuss in groups what would happen if someone did not have enough red cells. Explain anaemia (objective 3) and link it with the need for iron in the diet. Ask the pupils why do they think iron in the diet is more important for woment than for men. If you have time you should also discuss haemophilia and internal blood clots.

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Lesson Plan

Unit 12 Project 1

The Life Cycle of a Mosquito

Time We suggest that this Project will require a time equivalent of two periods, but the work may have to be spread over several weeks.

Objectives At the end of the Project the pupils should

(1) know that dengue fever, malaria and "elephantiasis" are diseases in which the blood is infected by a microbe (germ or worm).

(2) know that mosquitos are responsible for transmitting these diseases.

(3) be able to identify the eggs, larva, pupa and adult of the mosuito in the laboratory and in the world around them.

(4) be able to recognize on an adult mosquito, or drawing of a mosquito, its proboscis and describe in their own words how a mosquito uses its proboscis to suck blood from humans and other animals.

(5) be able to explain in their own words that for a mosquito to spread the diseases in (2) they must first suck some blood from an infected person - only then can they pass on the disease when they bite other people or animals.

(6) be able to explain in their own words that we can help to control mosquitos by,
-- spraying a film of oil on water where mosquito larvae and pupae live.
-- encouraging mosquito-eating fish such as tilapia

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and gourzon to breed in mosquito infested areas.

Equipment Each group of pupils will need

— a photograph of someone with elephantiasis
— a microscope and slides
— a mosquito larva and pupa (and eggs if possible)
— two containers e.g. tin cans, plastic cartons
— sellotape and paper for labels
— some (cooking) oil or kerosine.

Suggested Lesson Format

Introduction

Get the pupils to look at the photograph of the person with elephantiasis. Explain that the swelling is caused by a disease called "elephantiasis" - and ask why they think the disease should have this name. Ask if they have ever seen anyone with this disease. Let the pupils discuss the disease and what they think causes it. In the discussion bring out the idea that elephantitiasis is a disease of the blood caused by microbes (worms) and that mosquitos help to spread these worms (objective 1)
(For P9 level we are regarding the lymph system as an integral part of the circulatory system).

Activity Ask the pupils if they know of any other diseases spread by mosquitos. They will probably know what Dengue fever is but you may have to explain that malaria is another type of fever which kills many people in Africa, Asia and America (Objective 2).

Ask the pupils where mosquitos come from - what do 'baby' mosquitos look like. Then let them look at the eggs (if available) - the larva and the pupa. Get the pupils to sketch what they see onto a loose sheet of paper. Then get them to follow the life cycle in their units.
Point out how both the larva and the pupa come to the surface

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to breathe. Next let the pupils look at the (eggs) larva and pupa under the microscope (Objective 3) and then draw diagrams of these in their books. Get the pupils to set up activity 4 and let them carry out the rest of the activities over the next few weeks.

Whenever you collect some adults let the pupils look at them under the microscope to see the proboscis (Objective 4).

Discussion and Evaluation

Let some of the pupils describe to the class or 'act out' how a mosquito 'bites' someone. From this lead on to what would happen if a mosquito bit someone with Dengue fever and then bit a healthy person (Objective 5).

After the class has com pleted all the activities allow the pupils five to ten minutes to discuss in groups how we could prevent mosquitos and so control the diseases they spread. Encourage them to think about controlling the larvae and pupae as well as the adults (Objective 6). Finally check that the pupils have achieved all six objectives.

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Lesson Plan

Unit 12 Topic 4

Digestion and Health

Time We suggest that this Topic should take four or five periods.

Objectives At the end of the Topic the pupils should;

(1) be able to identify in a diagram of the digestive system; the gullet, stomach, small intestine, large intestine and anus .

(2) know that before our food can pass into the blood it must be digested - broken down into small molecules.

(3) explain in their own words that small molecules of digested food pass through the small intestine walls into the blood and that water is absorbed in the large intestine

(4) know that enzymes help digest food. They can change starch into sugar, protein into amino acids and fats into small molecules.

(5) know that the liver stores carbohydrate, minerals, such as iron, and vitamins.

(6) apply the knowledge that they have gained in 1 to 5 above to help in their understanding of the effect that chemical poisons, and infections by worms and other microbes may have on their body.

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Equipment

Each pupil will need one, A4 sheet of cards for 'Digestive Snap and Grab' and each pair or group will need scissors, some felt tip pens, markers or crayons. The instruction sheet for the game is in the back of the pupils' books.

Each pair or group will need a beaker (100 or 250 ml), about 10ml of 1% starch solution,@ two test-tubes and some Iodine solution. If the pupils request it you may need a 10ml measuring cylinder.

@ Test out your starch solution before the lesson to make sure that your own saliva will convert all of the starch within approximately one minute.

Suggested Lesson Format

Introduction

Wash your hands and then start to eat a sweet or biscuit. Chew then swallow it. Ask the pupils to describe what happens to the sweet after you have swallowed it. (If any pupils mention the 'Rules of the Laboratory' remind them that you washed your hands before starting).
Get the pupils to suggest their names for the different stages of the digestive system.

Activity

Let the pupils look at the diagram on page 10 and trace out with their fingers the different parts of the digestive system as you name them.

Give each person a card sheet and let them read the instructions for the game. Let each pupil cut out and colour his/her own cards. Let two or three pupils show the others how to play and then let the pupils play in group of 2,3 or 4. As they are playing move from group to group to check that the pupils can name and identify the different parts of the digestive system (Objective 1).

Remind the pupils that the blood carries food to the muscles. Ask them how do they think the food gets into the blood.

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Discuss the idea that we need to break up our food into very tiny pieces - or molecules - so that it can pass through the walls of the small intestine into the blood system. Explain that this is what we mean by digestion - the breaking up of food in the body. (Objective 2,3)

Introduce the word enzymes. Let the pupils read Section 4.2 and then ask them to plan an experiment to see if they have this enzyme in their mouths. Allow them some time to plan and discuss their experiment in groups of two or three. You and the technician should listen to each group's plan and when it is satisfactory allow them to begin.

Let each group report to you on what they did and what conclusions they came to. Then let each individual write up their own reports. For slower classes you may need to write some "key" words on the board.

Discussion and Evaluation

Move around the class checking what the pupils write. By questioning individuals you can also evaluate the pupils' achievement of objectives 1 to 4. Ask the pupils if they can remember the different types of food we eat - carbohydrates and fats, proteins, minerals and vitamins. Explain that starch, fats and proteins are too large to pass through the intestine (with more able classes you may need to use the word molecules and explain that starch, fats and proteins have large molecules). Explain that the large molecules are broken up (digested) into sugar, amino acids and small fat molecules so that they can pass through the intestine wall into the blood. (objective 4). Explain briefly the role of the liver in storing carbohydrate,

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minerals and vitamins (Objective 5).

Ask the pupils if any of them have ever had any trouble or problems with their digestive system. Allow a few individuals to describe "what happened" and why they think it "happened". Use this discussion to lead on to and achieve Objective 6.

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Lesson Plan

Unit 12 Topic 5

Tasting and Smelling

Time A double period

Objectives At the end of the Topic the pupils should

(1) know that it is difficult to identify food by taste alone

(2) know that we may need both taste and smell to identify the flavour of a food

(3) be able to design and carry out an experiment to identify where the taste buds for sweet, sour, salty and bitter are on the tongue.

Equipment You will need an orange or another strong smelling citrus fruit.

Each pair of pupils will need

-- a rubber-teat dropper or a piece of blunted glass tubing
-- four or five beakers or petri dishes
-- some solutions of salt, sugar, vinegar, lemon baking soda and some tonic water.
(It will be best if you leave the tonic water without a cap for half an hour or so before the lesson)

Suggested Lesson Format

Introduction Without letting the pupil see your hands peel an orange - for example you could peel it inside an open drawer. Ask the pupil if they can say what it is you are doing , ask them to explain how they know.

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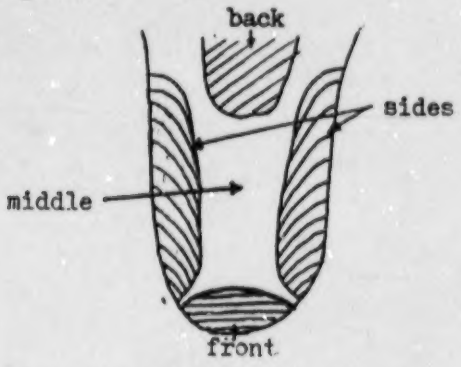
Activity

Let the pupils discuss the difference between the sense of taste and the sense of smell. For example, can they smell a thing without tasting it, and can they taste something without smelling it? Let them read Sections 5.0 and 5.1. Make sure they understand what to do and then allow them to carry out the activity. Check their results as they do the experiment and let each group explain what they have discovered. The allow the group to proceed to 5.2. Again allow each group to explain to you what they did and what they discovered.

Tell the pupils that we use different parts of the tongue to taste different "tastes".
Draw a diagram of the tongue on the board and identify the different areas you want the pupils to investigate.



Discuss the 'taste' of the different solutions so that the pupils agree that

sugar = sweet
salt = salty
vinegar sour
tonic water = bitter

Then let the pupils discuss with their group how they would find out which part(s) of the tongue 'taste' the four different 'tastes'. Let them explain their design to you and when you are satisfied let them carry out the activity.

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Discussion and Evaluation

Let each group report to the class on their results. Draw a chart on the board and use the results of each group to make a summary for the whole class. (Normally we can taste sweet and salt at the front, sour at the sides and bitter at the back).

Ask if anyone in the class has a cold. If so check their ability to differentiate the smells. If no one has a cold you may have to discuss what would happen.

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Lesson Plan

Unit 12 Topic 6

Getting Rid of Waste

Time Two to three periods

Objectives At the end of the Topic the pupils should

(1) know that we pass out some water -moisture - in our breath

(2) be able to explain in their own words that we lose water and salts through our skin as sweat and that by sweating we help to control our body temperature

(3) be able to show where the kidneys are in the body

(4) know that our kidneys filter our blood and remove wastes, poisons and excess salts and water

(5) know that the substances removed from the blood form urine and that urine is stored in our bladder before being passed out of our body

(6) test a sample of urine to check (a) its pH
(b) if it contains sugar

(7) know that diabetes is a disease in which a person will pass out sugar in their urine

Equipment Each group of pupils will need

— about 5 ml of methylated spirit
-- a hand mirror
-- a sheet of card
-- some pH paper

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— three samples of urine @ ,
one of which should contain sugar
— some Bendict's or Millon's reagent

@ you may use 'natural ' urine if possible but if you wish you can make "artifical" urine from, urea, or ammonia solution and a little yellow paint or dye. Adjust the pH to be close to 'natural' urine.

Suggested Lesson Format

Introduction

Ask the pupils what makes them thirsty. Let a few individuals describe to the class what it feels like to be thirsty and when or what things make them thirsty. Then ask what happens to the water we drink. Bring out the point that not all the water we drink is passed out as urine.

Activity

Let the pupils carry out activity 6.1 in groups or pairs, then 6.2 and 6.3. Let individual pupils explain what they have done and what wastes are passed out in our breath and sweat (Objective 1). Ask the pupils why do they think we sweat. Get each to place a drop of methylated spirit on the back of his/her hand and blow on it. Ask them to explain- what it feels like and what happens. Spend a few minutes discussing how sweating helps to control our body temperature, and ask what would happen if we couldn't sweat.
-- with more able classes you might get them to compare how they feel on a hot dry day and on a "clammy" humid day and also why we use fans to cool people down. (Objective 2)

Ask the pupils to estimate how much water they lose each day as sweat and use this to revise the point that we lose most liquid through urination. Remind them that water is absorbed through the large intestine

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into our blood and is being continuously filtered by our kidneys to remove wastes, poisons and dead cells. Show the position of the kidneys and let the pupils work in pairs to point out each others kidneys. Ask the children - if the blood is being continuously filtered - why don't we have to continuously go to the toilet. You can lead from this to a discussion of the idea of a 'weak' bladder (Objectives 3,4 and 5).

Show the pupils the three samples of urine. Let them measure the p H of each sample. (The more dilute the 'urine' is the less acidic it is likely to be).

Ask the pupils if anyone has ever heard of knows of someone who has diabetes. Allow a pupil to describe the disease. Explain that one of the main symptoms is that a person passes sugar in their urine. Ask the pupils to say how they would test the three samples of urine to see if any of the people concerned had diabetes. Let the pupils carry out activity 6.6 after they have discussed their plans with you (Objective 6 and 7).

Discussion and Evaluation

Most of the discussion and evaluation for this Topic should be carried out during the lesson but make sure you check that the pupils have achieved all the objectives before the end of the lesson.

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Lesson Plan

Unit 12 Project 2

Putting Waste to Good Use

Time

This Project will require an equivalent of about two periods spread over a number of weeks

Objectives

At the end of the Project the pupils should ;

(1) know that chickens and other birds do not pass urine but get rid of the waste from their kidneys as solid droppings - uric acid

(2) be able to test the pH of bird droppings

(3) be able to carry out an experiment to test whether or not seedlings will grow better if they are 'watered' with a solution containing some bird droppings or with pure distilled water.

(4) be able to keep records of the growth of a seedling and draw a graph to illustrate this

(5) be able to apply their knowledge and understanding of objectives 1 to 4 when growing crops.

Equipment

You will need some fresh chicken droppings, about 10 g for each group.

Each group will need

-- a beaker of water, a measuring cylinder (100ml)

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some pH paper or Universal Indicator and the use a balance.

— some fresh seed (For example Okra or beans) some (well-washed) sand and two seed trays or plastic cartons.

— you will also need a seedling or young plant growing in a pot or tray.

Suggested Lesson Format

Introduction — Ask the pupils if birds urinate. Let a few members of the class discuss their ideas. Then bring the class out to the poultry house to see for themselves.

Activity — Let the pupils see the fresh droppings that you have already collected. Ask them if they smell the same as urine and how could they test their pH. Back in the classroom let them carry out activity 2. Summarize the results of each group on the board (Objective 1&2)

Ask the pupils what should we do with the droppings from the chicken house - could they be of any use ? Let the pupils read Section 3 and then allow them a few minutes to discuss with their group what they are going to do. When you are satisfied that they understand and have planned to look after the seedlings for 2 - 3 weeks let them start the activity.

Using a seedling that is already growing demonstrate to the pupils how to measure its height and record the result on a block graph.

Discussion and Evaluation

Check the pupils' understanding and achievement of objectives 1 to 3 as they carry out and discuss the activities. You should check on their achievement of objective 4 as they draw their graphs. After 2 to 3 weeks compare and discuss each groups graphs and display them on the laboratory wall.

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Lesson Plan

Unit 12 Topic 7

Sensing With Your Skin

Time — Three to four periods

Objectives — At the end of the Topic the pupils should

(1) know that some parts of the skin are more sensitive to touch than others

(2) be able to carry out an experiment to identify areas of the skin most sensitive to touch

(3) know that many skin problems - such as blackheads and sores - arise because of peoples' poor washing habits

(4) be able to design, carry out and record the results of an experiment to find out whether the finger tips or the elbow are more sensitive to variations in temperature

(5) be able to apply their knowledge and understanding of objectives 1 to 4 in their everyday lives.

Equipment

Each pair of pupils will need

— a piece of fine wire about 5 cm long and a ruler or metre stick

Each group of pupils will need

— a microscope and slide
— a thermometer, burner, tripod and gauze, and a 250 ml beaker
— two or three basins for each group

Twelve basins have been supplied to every

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school for the lower and middle primary science programme. You should arrange to borrow these.

Suggested Lesson Format

Introduction

Select three pupils. Leave them in the prep room with the technician and then bring them in to the classroom one at a time, either blindfolded or with their eyes closed. Ask each to identify an object, such as a fruit or vegetable, first of all using the back of their hand and then using their finger tips. Let the class discuss why it should be more difficult to identify things with the backs of our hands.

Activity

Let the pupils read 7.0, 7.1 and 7.2. Let each pair of pupils plan what they are going to do and then let one or two pairs explain to the class. Let the pupils carry out activity 7.1. Move around the pairs and check and discuss their results (Objective 1 and 2).

Let the pupils carry out acticity 7.3. Draw the shape of the hair root on the board and ask the pupils what will the skin look like after the hair has been pulled out. Use the idea of the "hole" left in the skin becoming blocked with dirt and germs to lead to a discussion on skin care.

Ask if anyone in the class has a baby brother or sister. Ask them to describe how their mother bathes the baby and how she tests the temperature of the water. Ask the pupils which do they think would be the best way to test the temperature - fingertips or elbows and how could they find out for sure. Allow the groups a few minutes to plan and discuss the experiment. Check each group's

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plan and when you are satisfied let them carry out the experiment . We suggest that the experiment should compare the smallest range in in temperature that your elbow and finger tips can detect. For example by comparing the temperature in bowls of 30 °C and 40 °C. If both fingertips and elbows can detect the hotter then try comparing water at 35 and 40 degrees.(Objective 4)

Discussion and Evaluation

Allow each group a few minutes to discuss their results and prepare a report for the class. Then let all or some of the groups present their reports (Objective 5)

Finally ask everyone to write up what they did, what results they got and what conclusions they came to. For slower classes use key words. Move around and check the pupils' work and achievement of the objectives.

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Lesson Plan

Unit 12 Topic 8

What is Your Reaction ?

Time Two to three periods

Objectives At the end of the Topic the pupils should

(1) know that our nerves carry messages from our senses to the brain and from the brain to our muscles

(2) be able to compare experimentally their speed of reaction with that of other pupils

(3) know that if a car is travelling along at normal road speed it will travel many metres before the driver can react and stop

(4) be able to estimate on a road or playground, to within $\pm$ 10 m , the distance a car travelling at normal road speed (i.e. 40 k m per hour) will travel before a driver can react to an emergency and stop.

(5) be able to apply their knowledge and understanding of objectives 1 to 4 in their everyday lives.

Equipment Each pair of pupils will need
-- a ruler or metre stick.
You will also need one or two tape measures for activity 8.5

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Suggested Lesson Format

Introduction	Remind the pupils about the previous Topic. Discuss how some parts of the skin are more sensitive to touch than others. Ask each pupil to press their finger onto the point of a pen or pencil. Ask what happens. Get the pupils to describe how they 'feel' the pain in their finger, yet their whole arm moves away. Ask how does your arm know that it should move away.
Activity	Let the pupils read Sections 8.0,8.1 and 8.2. Let one pair demonstrate to the others what to do and then let everyone carry out the activity and then discuss what happens. In the discussion bring out any variation in pupil responses. (Pupils do not need to know about reflex arcs). Tell the pupils that now they are going to see how quickly they can 'react' or move. Let them read 8.3 and 8.4. Demonstrate how to hold,drop and catch the ruler. Then let the pupils carry out the activity. Compare the results of different individuals and let two or three fastest compete against each other at the front of the class (Objective 2). Emphasize the delay between seeing something and reacting to it and then lead on to how far a car will travel during the time it takes the driver to see and react to an emergency. Let the pupils read 8.5 and bring the class outside either to the playground or to a quiet stretch of road. Measure out the total distance needed for reacting and braking (Objective 3,4 and 5)

Discussion and Evaluation

Back in the classroom summarize with the pupils what they have done today. Revise and check their understanding and achievement of the objectives.

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Lesson Plan

Unit 12 Topic 9

Using Your Eyes

Time Two to three periods

Objectives At the end of the lesson the pupils should

(1) be able to identify on a drawing of an eye the eyelid, eyelash, iris and pupil

(2) be able to measure the maximum angle of vision in a flat plane

(3) be able to construct a diagram to represent his/her range of vision to within $\pm$ 10 degrees accuracy

(4) know that two eyes give us a greater range of vision than one eye

(5) know that there is a 'blind spot' within each eye

Equipment Each pair of pupils will need

— a piece of string about 30 cm long
— a piece of chalk
— a protractor

Suggested Lesson Format

Introduction Ask the pupils to look closely at their partner's eyes, then to sketch a drawing of an eye. When they have done this sketch a front view of an eye on the board and label - the eyelid, eyelash, iris and pupil. Let the pupils label the drawings in their books (Objective 1).

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Lesson Plan

12 Topic 10

Looking After Your Eyes

Time — A single period

Objectives — At the end of the Topic the pupils should be able to explain in their own words that ;

(1) when we blink we wipe clean and moisten our eyes

(2) our eye lids and eye lashes help to stop things getting into our eyes and so help to protect our eyes.

Equipment — No special equipment needed

Suggested Lesson Format

Introduction — Revise the drawing the pupils made of the front view of an eye. Label the eyelid, eyelash, iris and pupil. Then very simply and briefly discuss the functions of the iris and pupil.

Activity — Let the pupils read and carry out activity 1 .1 Let them describe what happens and why they think it is so. The let them read and carry out activity 1 .2. Allow the pupils some time to discuss in groups of three or four,

"Why do we blink and what are our eyelashes for?"

Let one or two groups give their reports to the rest of the class. The discuss the various ideas with the class (Objective 1 and 2)

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Let the pupils write up in their own words, what they did, what happened and what they found out. Use key words or phrases where necessary.

Discussion and Evaluation

Ask the pupils if any of them have ever had an infection of the eye. Ask individuals to describe what it felt and looked like - what they think cause it and what was done to make it better. The discussion can also lead on to what we should do if we get something in our eye and why we should not look directly at the sun.

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Lesson Plan

Unit 12 Topic 11

Using Your Ears

Time Two to three periods

Objectives At the end of the Topic the pupils should

(1) know that there are some high pitched sounds that we cannot hear

(2) know that sometimes we can misinterpret sounds

(3) be able to explain in their own words that wax in our ear helps to prevent infection

(4) after assessing evidence presented be able to reach an informed decision on the advisability of having their ears pierced.

Equipment You will need a set of three or more tuning forks (or a musical instrument) and a cassette tape recorder. You will also need to have the tape for "Using Your Ears". This has been recorded on the same tape as "Human Reproduction" Unit 6.

Each group of pupils will need

-- a microscope and slide
-- some cotton wool and a matchstick / or else a cotton bud
-- some paper (for the fat test).

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Suggested Lesson Format

Introduction

Use Section 11.1 as your introduction. Get all the pupils to sit very quietly with their eyes closed and let them write down all they hear. Allow them a few minutes for discussion and then get individuals to report.

Activity

From the discussion draw out the idea that often it is hard to identify something by sound alone. Then ask the pupils to close their eyes again and try to identify the ten sounds on the first section of the tape. Lead a discussion on what the different sounds are. As a pupil gives an answer get them to describe why they think that's the answer.
When there is general agreement play the first part of the tape again and discuss the sounds (Objective 2)

Ask the pupils if they or anyone else in their house ever hear sounds that other people cannot hear. Let them discuss why this should be. Explain that this may be because these peoples' ears are more sensitive and can hear "softer" sounds - but they also be able to hear sounds that are so "high" other people cannot hear them. Use the tuning forks - or instrument- to demonstrate that we can have notes of different pitch. Use the forks to show the difference between loudness and pitch. The pupils do NOT need to know about wave motion or amplitude of waves etc.

Tell the pupils that on the tape there are notes of many different pitches. Tell them you want them to close their eyes and listen carefully to the tape. As soon as they hear the first sound,

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after the introduction, they should put up their hand quietly . Keep a record of the order different people hear the note - just a rough note of who was first etc. After you have played the tape name two or three people who heard the highest pitch sounds. Repeat the tape but this time allow the pupils to keep their eyes open. Use the discussion to reinforce Objective 1.

Ask the pupils to suggest anything that might make it hard for them to hear a sound. Develop the idea that if the ears are blocked they wouldn't be able to hear properly. (There is an old joke you might use, about a man walking down a street with a banana in each ear. Three or four people stop him to tell him about them but he cannot hear them and so walks on. To the last person he says "You'll have to speak up. I've got bananas in my ears".)

Discuss what could block our ears. Let the pupils carry out activity 11.4 and in the follow up discussion bring out the importance of wax for preventing infection (Objective 3).

Discussion and Evaluation

Make a summary of the lesson so far and check the pupils' achievement of Objectives 1 to 3.

Check how many girls have their ears pierced. Ask one or two who havn't, why they havn't. The ask one or two who have why they got them pierced. Select two teams, of 3 or 4 pupils each, with boys and girls in both teams to debate whether piercing ears is good or bad. Allow the teams at least ten minutes to prepare and then let the rest of the class 'judge' the debate.

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Lesson Plan

Unit 12 — Topic 12

Using Your Brain

Time — Three to four periods

Objectives — At the end of the Topic the pupils should

(1) know that our brain uses our memory to help us intrepret the information we get from our senses

(2) understand that different people may interpret the same information in different ways

(3) know that we have an organ in our heads which helps us to maintain our balance and that this organ may be affected by drinking alcohol

(4) be able to explain in their own words why it is dangerous to drive after drinking alcohol.

Equipment — Each group will need ;

— twenty different common objects such as matches, comb, scissors, stone, string, flower, paper clip and drawing pin.

— beakers with 10 to 20 ml of, ammonia, vinegar, methylated spirit, hydrogen sulphide (Make with a metal sulphide and dilute hydrochloric acid), kerosine and oil.

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Suggested Lesson Format

Introduction

Explain to the pupils how to play 'Kim's Game' Each group will have twenty common objects. One member closes his/her eyes while the others set out fifteen of the objects. The first person is allowed one minute to "remember" as many of the objects as possible. Then the objects are covered over and the person has to list them. Each person in the group does this - with the other members changing the objects each time. They may also exchange objects with other groups. Each person should keep a record of the things he/she forgot and remembered.

Discuss who remembered the largest number of things. Discuss the type of things people remembered most easily and ask people "why" and "how" they remembered certain things.

Activity

Explain to the pupils how you want them to carry out activity 12.1. Emphasize that you are not asking them to identify the chemicals but only to write down what they are reminded of.

Allow the groups 5 to 10 minutes to discuss their results. Then lead a discussion on what the smells reminded people of. Point out that people were reminded of things they had memories - past experiences of. (Objective 1 and 2).

Let the pupils look at and discuss the drawing in 12.2. Bring out the two intrepretations of the drawing - some pupils may 'see' a vase while others may 'see' two faces staring at each other. (Objective 2).

Suggest that different people 'seeing' the same event may have different views of what happened.

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Divide the class into groups of four or five. Group 1 will be your actors. They should go into the prep room. Get the technician to tell them a story - incident - to act out. For example, the four pupils will walk out into the classroom. A will quietly trip B. B will then slap C. Pupil A will secretly 'nip' D, who will turn around and hit B. C then talks quietly to A, while B and D argue.

While Group 1 are preparing in the prep room, three people from each group are to sit at the back facing away from the board - closing their eyes and keeping their fingers in their ears.

Observers from each group will sit along the front of the room and watch the incident. The observers will then tell one person from their own group what happened. This person will then tell the other members of the group. These last (two) are then to individually write down what they were told. Bring the whole class together again and get each of the 'writers' to call out exactly what they have written down. Discuss the difference in the reports and the difference between observations and interpretations. Ask the pupils to relate what happened in the class acti ity to what might happen at a road accident or street fight (Objective 5).

Discussion and Evaluation

Let the pupils read and then carry out Section 12.5. Ask one pupil to spin around again and then to try to walk along a straight (chalk) line. Relate this to driving in a straight line. Allow each group 5 to 10 minutes to discuss the dangers of drinking and driving and how we could discourage it. Let each group report what they think should be done (Objective 3).

Summarize the lesson and check on the pupils' achievement of the objectives.

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SEYCHELLES INTEGRATED SCIENCE

Unit 12

SE045071

CONSERVING OUR HEALTH

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THE MINISTRY OF EDUCATION AND INFORMATION

R E P U B L I C O F S E Y C H E L L E S

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UNIT 12

TOPIC 1

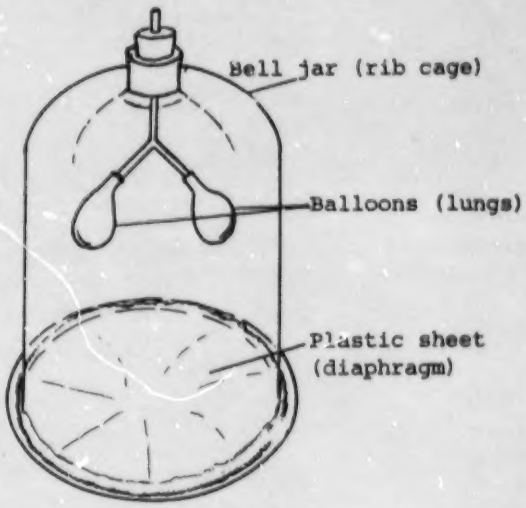
BREATHING AND HEALTH

1.0 You first started to breathe on the day you were born. You have been breathing ever since. We shall try to find out more about breathing.

1.1 Put your fingers on the bones of your rib cage. Breathe as much air as you can into your lungs. Now slowly let the air out. Describe what your rib cage does as you breathe in and out.

1.2 Inside your body, there is a flat sheet across the bottom of your rib cage. We call it the diaphragm.

We can make a model to show how our diaphragm helps us to breathe. Describe what happens as the "diaphragm" of the model moves up and down. Suggest how the diaphragm in your body helps you to breathe.



BREATHING AND HEALTH

1.3 Place your hands on your ribs. Sit still and breathe normally for one minute. Count the number of breaths that you take. Record this as your "normal" breathing rate - the number of breaths you take in one minute.

1.4 Now do some exercise for a few minutes. As soon as you have finished, measure and record your new breathing rate - "after exercise".

1.5 Continue to count and to record your breaths every minute until your rate of breathing becomes "normal". You can draw a graph of your results.

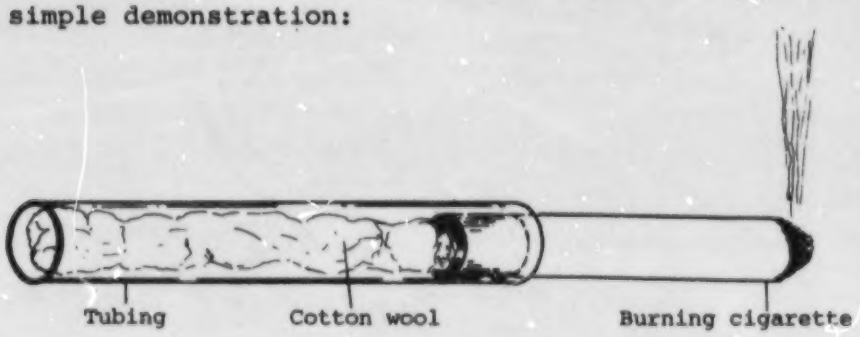
Why do you think you breathe more often during and after exercise ?

1.6 The breathing rate of a fit person returns to normal more quickly than that of an unfit person. Compare your results from 1.5 with your friends'. Find out which of you is the most fit.

Discuss what you think can make a person fit.

1.7 There are many health problems that can affect fitness. For example, people who have asthma sometimes cannot breathe easily. Other people create their own health problem when they smoke. People who smoke often develop bad coughs and lung diseases.

1.8 We can see how smoking can affect our lungs with a simple demonstration:



Place a cigarette into a tube with cotton wool inside. Make sure that it fits tightly. Light the end of the cigarette and watch as we pull air through the tube. When the cigarette is finished, describe what has happened to the cotton wool in the tube.

1.9 Discuss why smoking is bad for your health. Find out more about the relation between smoking and lung cancer, heart disease, chronic bronchitis, emphesema and so on.

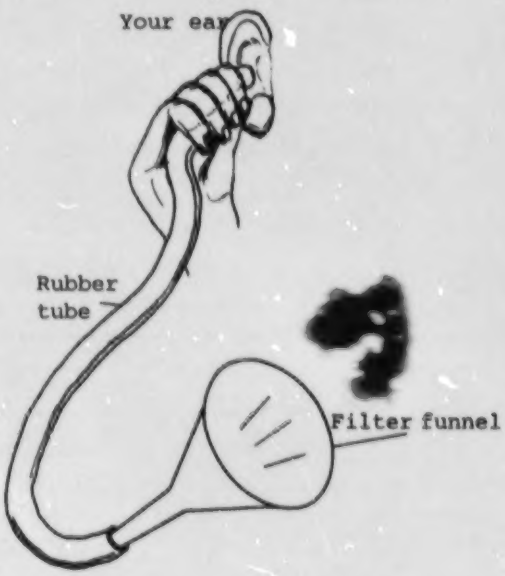
UNIT 12

TOPIC 2

CIRCULATION IN YOUR BODY

2.0 In Topic 1 we learnt about breathing and some of the health problems that affect it, especially for people who smoke. Smoking can also affect other parts of the body, such as the heart. Now, we shall learn more about the heart.

2.1 You can listen to your heart beating with a "stethoscope". You can make one using a filter funnel and some rubber tubing.



Hold one end of the tube in your ear. Press the funnel against your chest. Move it around until you can hear your heart beating. (You will have to sit very quietly to hear it).

Describe the sound that your heart beat makes. Listen to the heart beats of your friends. Do they all sound the same ?

2.2 Use a stop watch and your stethoscope to measure your normal heart beat rate (the number of beats in one minute). Sit quietly while you do this.

2.3 Do some exercise for a few minutes and then measure your heart beat again. Why do you think that your heart beats more often during and after exercise ?

UNIT 12

TOPIC 2

CIRCULATION IN YOUR BODY

2.4 Your heart has the job of pumping your blood to all the parts of your body through tubes with thick walls called arteries.

Use your thumb or your fingers to feel the pulse in your wrist. (You may also be able to feel it in the upper part of your arm.)

Use a stopwatch to count the number of "pulses" in one minute. This is your normal pulse rate.

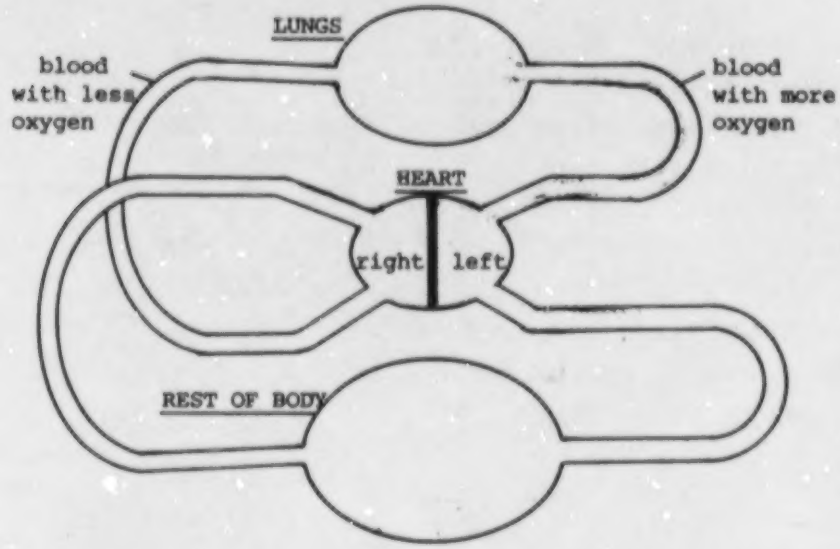
2.5 Compare your normal pulse rate with your normal heart beat rate. They should be quite similar, because when you feel your pulse, you are feeling the blood which your heart is pumping through an artery.

2.6 Now do some exercise. Record the increase in your pulse rate after exercise. Record how long your pulse takes to return to normal. This can also tell you how fit you are, as did experiment 1.6.

2.7 Blood returns to your heart through tubes called veins. Put your hand around your upper arm near your elbow. You should be able to see some of the veins in your forearm. Describe what they look like.

CIRCULATION IN YOUR BODY

2.8 The movement of your blood around your body is called your circulation. Look at the diagram below and follow where the blood goes, starting at the lungs:



N.B. We have drawn the picture looking from the front. So, we have drawn the right side of the heart on the left, and the left side of the heart on the right.

Make a model of your circulation using two colours of plasticene. Use one colour to show blood with more oxygen. Use the other colour to show blood with less oxygen. Make a labelled drawing of your circulation model.

2.9 Find out more about: - heart attacks, high blood pressure and other circulation problems.

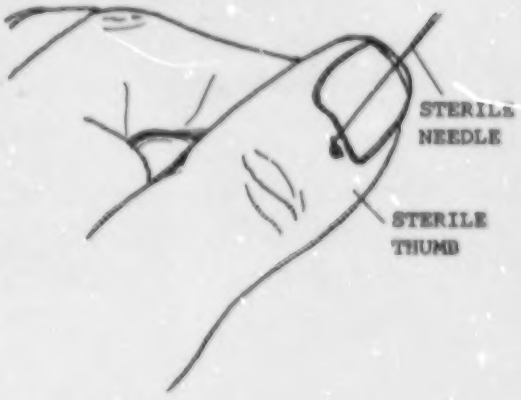
UNIT 12

TOPIC 3

LOOKING AT YOUR BLOOD

3.0 Every part of your body needs oxygen. During circulation, the RED BLOOD CELLS pick up oxygen from the air in your lungs. Now, we shall take a closer look at our blood.

3.1 Sterilise a sharp needle or pin. You can do this by holding it in a flame for a few seconds.
Tie a thread or an elastic band around your thumb.
Prick your thumb below the nail with the sterile pin.



3.2 Squeeze out a drop of your blood onto a slide. Use a microscope to look at it. You will see mostly red blood cells. Describe in your own words what they look like.

3.3 You may be able to see a few WHITE BLOOD CELLS if you are lucky. They are made in glands in your body and they help to fight disease.
There are also small bits of cells called PLATELETS which help to clot your blood. All of the cells float in a liquid called the PLASMA. The watery plasma contains food, waste and other dissolved substances.

3.4 Find out more about some common blood diseases in Seychelles: anaemia, haemophilia and blood clots.

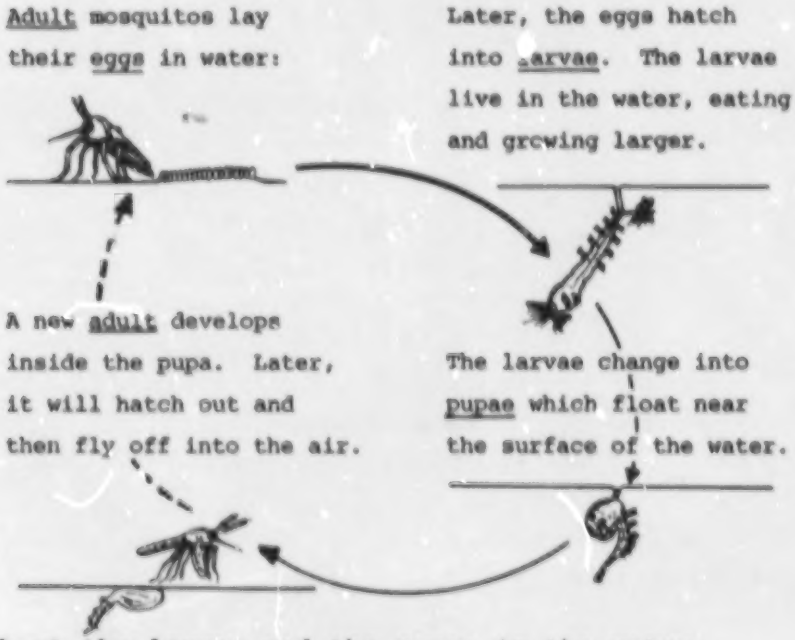
UNIT 12

PROJECT 1

THE LIFE CYCLE OF A MOSQUITO

1. Mosquitos are dangerous animals, but not because their bites are painful. Some of them can carry diseases, such as dengue fever and malaria. When they suck your blood, they can transmit a disease to your body. We shall now try to find out more about the life cycle of a mosquito so that we can understand how to control these diseases.

2. The adult lays eggs in standing water. These eggs hatch into larvae. The larvae grow bigger, and later change into pupae. A new adult can then hatch from the pupa.


Adult mosquitos lay their eggs in water:
Later, the eggs hatch into larvae. The larvae live in the water, eating and growing larger.
A new adult develops inside the pupa. Later, it will hatch out and then fly off into the air.
The larvae change into pupae which float near the surface of the water.

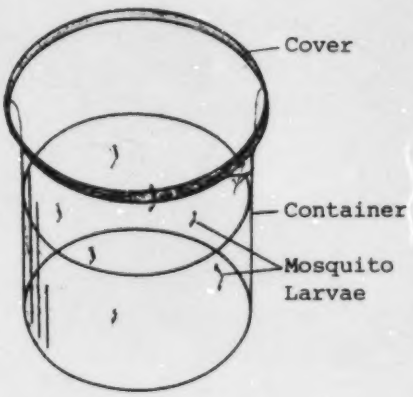
3. Look at the larvae and the pupae in the water. Describe how they behave. Try to find out how they breathe.
Now look at them using a microscope, and describe what they look like.

THE LIFE CYCLE OF A MOSQUITO

4. You can try to catch your own mosquitos. Pour some water into 2 containers and leave them in a place where you know there are mosquitos. Label your two containers with your name, the date and the time.

   Inspect your containers at least once every day; prepare a chart to show the date and the time when:
   - you started the experiment
   - you first see eggs floating in the water
   - you first see larvae in the water
   - you first see pupae in the water
   - you see the first adults that have hatched from the pupae.

5. When you have several larvae in a container, you will need to cover it. This will stop other mosquitos coming in. It will also stop the "new" adult mosquitos from escaping after they have hatched from the pupae.



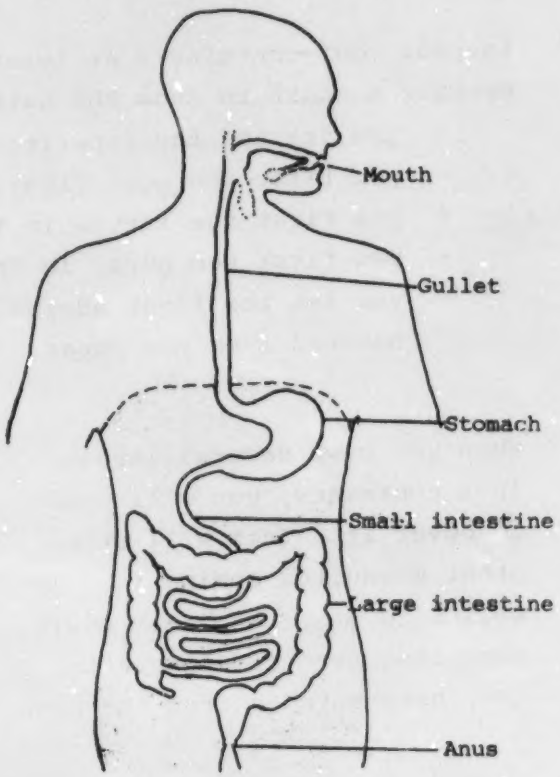
6. Pour some oil or kerosine into one of your containers when there are several larvae already there. Watch what happens. Compare how the mosquitos develop in this container compared with the other (without oil).

7. Discuss how we can control mosquitos in Seychelles. Why do you think that health officers spray every aeroplane that arrives here from another country ?

DIGESTION AND HEALTH

4.0 The pieces of food that you eat cannot pass directly into your blood because they are too large. You must first digest your food, breaking it into very tiny pieces. You digest your food as it passes through your DIGESTIVE SYSTEM:

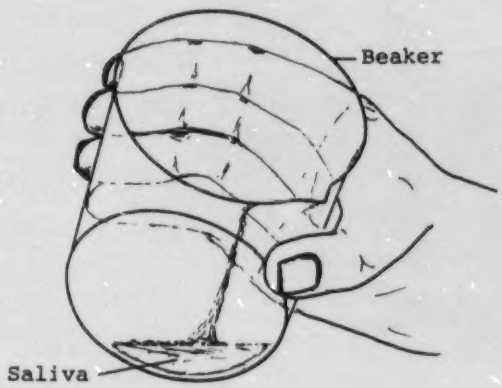
- from your mouth through your gullet to your stomach and then to your small intestine.
The material that remains (food you cannot digest and water) passes through your large intestine. There, some of the water enters your blood. Later, you will pass out what remains through your anus as faeces.



4.1 We can play a game to help us to learn about the parts of the digestive system. Cut out and colour in the cards that show the six different parts. Cut out the name cards for each part. Read the instructions about how to play "DIGESTIVE SNAP AND GRAB" with your cards.

4.2 There are special chemicals called <u>enzymes</u> in your digestive system which help to digest your food.

There is usually an enzyme in the saliva in your mouth. It can change starch into sugar.
Collect some of your saliva in a beaker. You can use it now to find out if <u>you</u> have this enzyme in your saliva.



Discuss with your group how you would do an experiment to find this out. Discuss your plan with your teacher. Describe your method. Record your results and compare them with others' in your class.

4.3 We need to change starch into sugar because starch cannot pass into our blood. In the same way, we must change <u>proteins</u> into <u>amino acids</u>. We must also change <u>fat</u> into smaller fat molecules.
Sugar, amino acids and small fat molecules can all pass into your blood. The blood carries them to your liver. Your liver can store carbohydrate, minerals such as iron, and some vitamins.

4.4 There are many diseases which can affect your digestive system, such as diarrhoea and appendicitis. Make a list of some of the ones that you know about. Discuss what causes these diseases, and what you could do to help cure them.

TASTING AND SMELLING

5.0 Your senses of smell and taste can tell you about the air that you breathe and the food that you eat. Let us find out more about tasting and smelling.

5.1 Hold your nose closed. Shut your eyes. Your friend will put a few drops of a solution on your tongue. You must say what you can taste. (Do not smell it).

Repeat this for other solutions and record your results.

5.2 Now try the experiment another way. Try to tell the solutions apart by smell only, with your eyes closed. Record your results.

Describe what you have found out about the senses of smell and taste.

5.3 Your tongue is sensitive to four tastes: sweet, sour salt and bitter. Design an experiment which would help you to find which part of your tongue is more sensitive to each of the four tastes.

5.4 Discuss the effect of a bad cold on your sense of smell.

UNIT 12

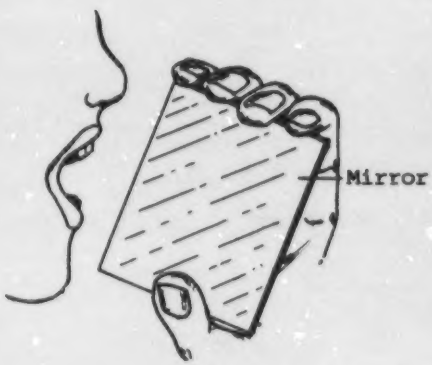
TOPIC 6

GETTING RID OF WASTE

6.0 Every day, you take in a lot of water with your food and drink. We learnt in Topic 4 that we pass out some water with our faeces. Now we shall try to find out where the rest of the water goes.

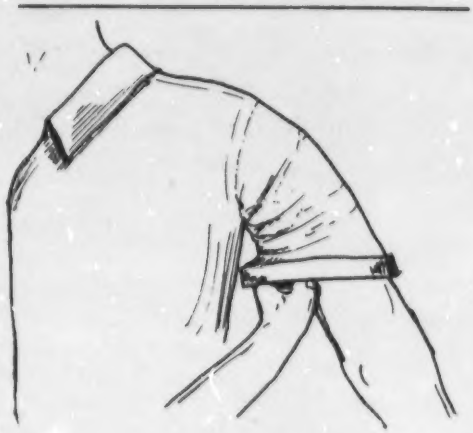
6.1 Open your mouth and hold a mirror in front of it. Breathe onto the mirror. Describe what you see Explain this.

What else is there in your breath ?



6.2 Run on the spot for two minutes. When you have finished, put your hand under your armpit. Describe what you feel.

Try to explain this and also describe any smell that you notice.



6.3 Now use a piece of card to fan air under your armpit.

Discuss how sweating can help to cool down your body.

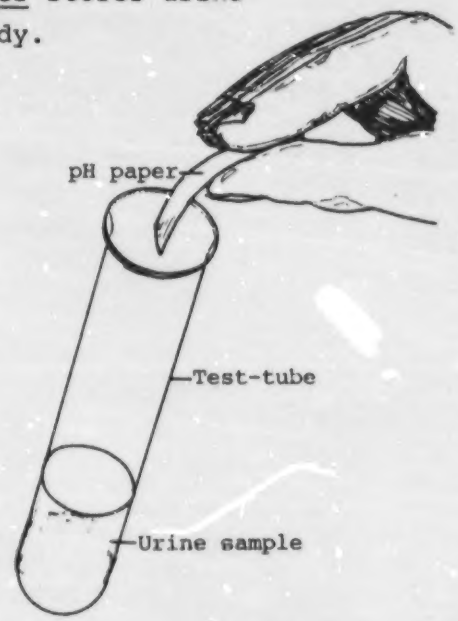
GETTING RID OF WASTE

6.4 Every day you lose you lose water and some waste materials from your body: - in breath from your lungs; in sweat from your skin; in faeces from your digestive system. However, there are also organs in your body called kidneys. They filter waste, poisons, some salts and water from your blood to make urine. Your bladder stores urine until you pass it out of your body.

6.5 Smell a sample of urine. Describe what it smells like.

Test the pH of the urine. Describe how you do this, and record your results.

Discuss whether you would expect your urine to have the same pH at all times.



6.6 Diabetes is a disease where there is too much sugar in the blood. Urine from people with diabetes has sugar in it because their kidneys filter the extra sugar out of their blood.

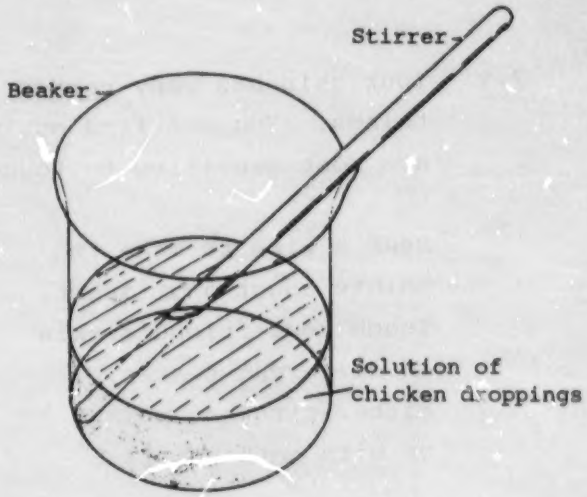
Test the samples of urine to find out if there is sugar in any of them. Describe how you did your test. Record your results and write one or two lines about what sort of diet you think diabetic people should have.

PUTTING WASTE TO GOOD USE

1. Collect some fresh chicken droppings from a poultry house. Describe their smell and how they look. Discuss whether chickens urinate in the same way that people do.

2. Make a solution with the droppings. Weigh about 10 g of droppings and mix them with 90 ml of water.

   Test the pH of the solution. Compare it with the urine samples that you tested in Topic 6.



3. Plant several seeds in clean sand in each of two seed trays. Water the sand in one tray with pure water. Water the sand in the other tray with the solution of chicken droppings:

4. Look at the young plants every time you come for your science lesson. Make a chart to record their growth. Write down any differences you notice between the plants as they grow older. Discuss and try to explain these differences.

UNIT 12

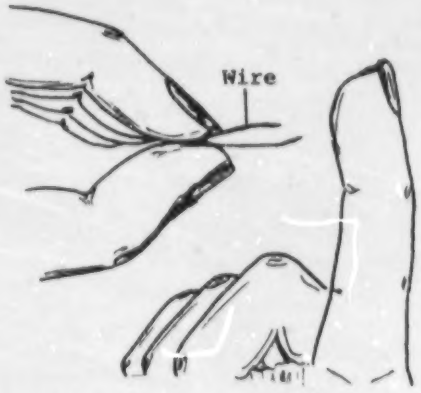
TOPIC 7

SENSING WITH YOUR SKIN

7.0 In Topic 6, we found that we can cool down by sweating through our skin. We are also able to get rid of some of our body waste in our sweat. However, sweating is only one of the functions of our skin.

7.1 Your skin has many nerves in it to help you to feel things. You can find out which parts of your skin are most sensitive to touch:

Bend a wire to make two points about 5 mm apart. Touch your friend's skin in different places, either with one point or with both points.



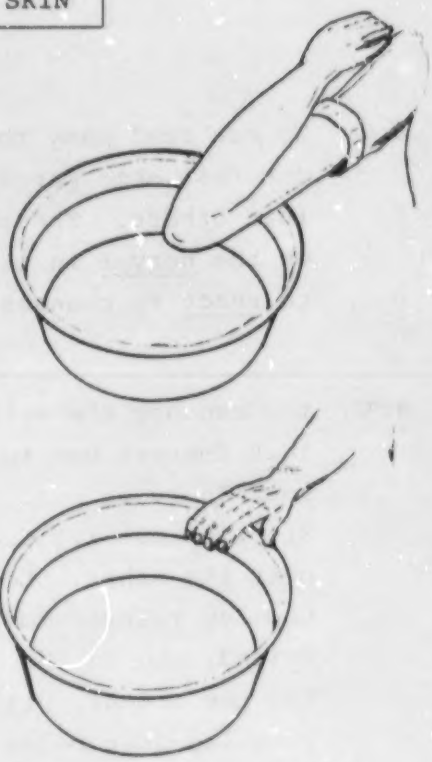
Find the places where your friend can tell the difference between one point and two points with closed eyes.

7.2 Make a list of the more sensitive places. Try to suggest reasons why these places are more sensitive.

7.3 Pull out one hair from your head. Suggest a reason why this hurts a little. Look at its root using a microscope. Draw the shape of the root.

7.4 Discuss what causes skin spots, dandruff and other skin problems that you know about.

SENSING WITH YOUR SKIN



7.5 One day, at the hospital, a patient saw a nurse put her elbow into a basin of hot water. The patient asked the nurse why she was doing that. The nurse said that she could feel if the water was too hot with her elbow.

The patient was puzzled; he thought it would be better to use the tips of the fingers to feel if the water was too hot.

7.6 When you have read 7.5 carefully, start to think how you could find out which part of your skin is the more sensitive: your elbow or your fingertips.

Discuss what you will do with the other pupils in your group. Discuss your plan with your teacher.

When your plan is ready, do the experiment. Write down your method and record your results. From your results, find the answer to the problem; this is your conclusion.

7.7 Do you think it is a good idea to have nerves in your skin ? Discuss what life would be like if you did not have any.

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UNIT 12

TOPIC 8

WHAT IS YOUR REACTION ?

8.0 We can feel many things with our skin. We have found out that some parts of our skin are more sensitive than others. The sensitivity of our skin depends on the nerves in it. Your nerves help your body to react to changes.

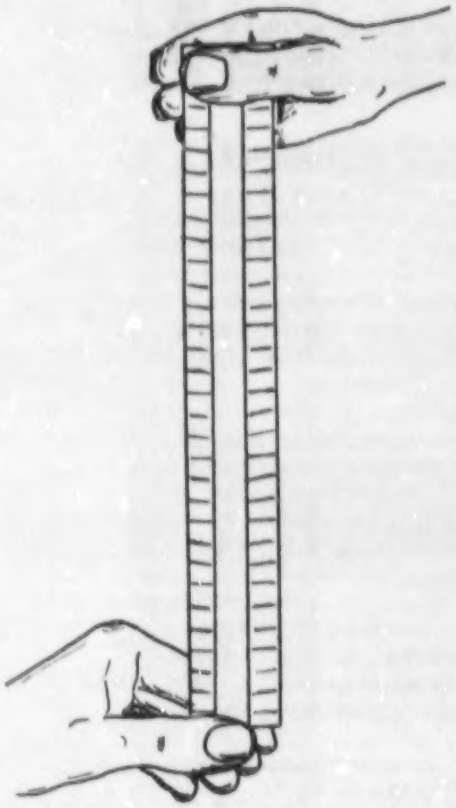
8.1 You can use the method that doctors use to test your "nervous reaction". Sit with one leg crossed over the other. Let your top leg relax. Your friend, who is the doctor for the moment, will tap your leg just below your knee bone with the edge of a ruler.

(Do not try to move your leg).

8.2 Repeat the same experiment on your friend's leg, with yourself as the "doctor".

Does everyone in the class get the same result ? Describe what you did and what happened in your book.

WHAT IS YOUR REACTION ?



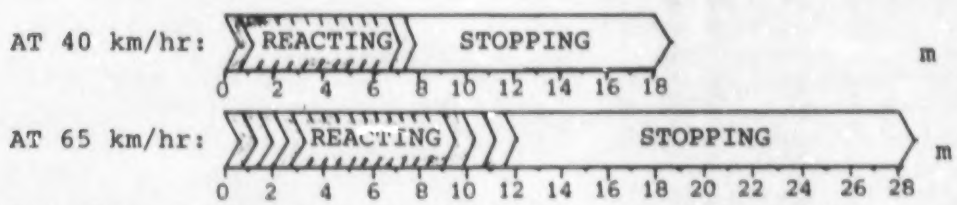
8.3 You can try to measure how fast your reactions are by using a ruler.

Your friend should hold a 30 cm ruler at one end. You should hold your fingers apart at the other end. You must try to catch the ruler when your friend drops it.

8.4 Record how many centimetres the ruler fell before you caught it. Repeat the same experiment several times; try to find out if your reactions improve with practice.

Note your best result. Compare it with other pupils' best results. Find out who has the fastest reaction.

8.5 A driver needs to have fast reactions. The charts below show how long a normal driver takes to stop:



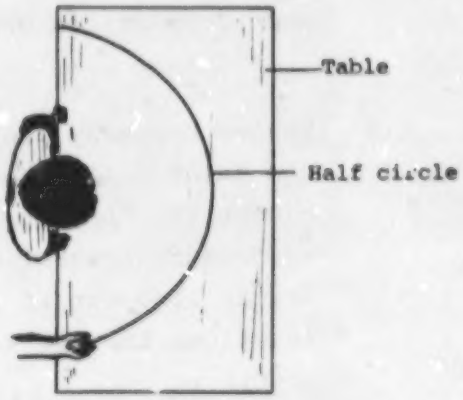
You can measure these distances near a road outside with a tape measure.

USING YOUR EYES

9.0 You rely on your eyes for fast reactions. Your eyes can see many things; colours, shapes and movements. They help you to judge distances and speeds. However, there are limits to what your eyes can see.

9.1 You can do a simple experiment to find the limits of your field of view.

Tie a piece of string 30 cm long to a piece of chalk. Hold the string in the middle of the edge of the table, and draw a half circle. Put your chin on the table at the centre of the half circle. Shut your left eye and look straight ahead.



9.2 Your friend will move a pencil around the circle, starting on your left. Say "stop" when you first see the pencil. Draw a line with chalk from your chin to this point on the circle.
Keep looking straight ahead while your friend moves the pencil slowly around the circle again. When you can no longer see the pencil say "stop" again. Draw a line from your chin to this point on the circle.

9.3 Repeat this with your right eye closed, and your left eye open. Draw a diagram, using a protractor, which shows the field of view of each eye.

USING YOUR EYES

9.4 Each of your eyes has a limited field of view. Even within that field of view, each eye also has a "blind spot". You can do a simple experiment to find the blind spot in one of your eyes:

✚ ●

Close your left eye. Look at the ✚ with your right eye. Hold this book about 30 cm away from your face. Slowly move the book towards your face; concentrate on the ✚ with your right eye. Describe what you notice. Discuss your answer with other pupils; did they all notice the same thing ?

9.5 As you moved the book closer to you, you probably found it more difficult to see the page clearly. Find and measure how close you can bring the book before it becomes uncomfortable to read it. Compare your own results with other pupils'.

9.6 Many people wear glasses to help them to see better.

"Long-sighted" people cannot see things near to them clearly.

"Short-sighted" people cannot see far away things clearly.

LOOKING AFTER YOUR EYES

10.0 We have just learnt something about the limits of our eyes' vision. Now we shall find out more about looking after our eyes.

10.1 Move your hand quickly towards your friend's eye. Describe what happens.

Repeat this a few times to find out if you or your friend can stop yourself "blinking".

(DO NOT TOUCH EITHER YOUR FRIEND'S EYE OR YOUR OWN. THE SURFACE OF AN EYE IS VERY SENSITIVE !)

10.2 Now bend your head and look down at the table. Blink your eyes 50 times. Describe what you can feel when you touch your eyelashes.

Discuss why you blink, and what your eyelashes are for.

10.3 Your eyes, like all parts of your body, can be affected by disease. Discuss and describe one or two eye diseases that you have had yourself or that you know about.

UNIT 12

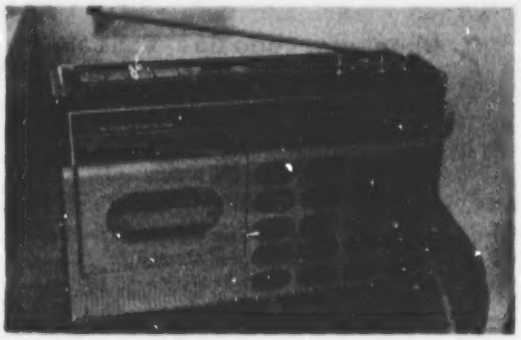
TOPIC 11

USING YOUR EARS

11.0 Our reactions do not only depend on our sense of sight, but also on our hearing and other senses.

11.1 Sit very still for one minute and listen. Write down all of the sounds that you can hear. When you have finished, discuss what you have heard with your friends and your teacher.

11.2 Try to identify some different sounds on a cassette tape. Write down what you think each sound is. When everyone has finished, compare your answers with your friends'. Did everyone hear the same things ?



11.3 You may be able to listen to some very high sounds on a tape; we use a machine called a signal generator to make these sounds. Find out which pupils in your class can hear the highest sounds.

11.4 CAREFULLY, using cotton wool, take some wax from inside your ear. Test it to see if there is fat or oil in it. Discuss how this wax helps to stop infections reaching the eardrum inside your ear.

11.5 Debate whether piercing your ears to wear earrings is a good idea.

USING YOUR BRAIN

12.0 Your brain has to <u>interpret</u> the sensations that your eyes see, that your ears hear, that your skin feels, that your nose smells and that your tongue tastes. Usually your brain does this by associating the sensation with a memory that you already have.

12.1 You can do an experiment to see if you have memories similar to your friends'. <u>Carefully</u> smell some chemicals. Write down what each one reminds you of.

When everyone has finished, compare your answers with your friends'.

12.2 Sometimes your brain can interpret a sensation in more than one way. Look at the picture (right): Write down what you see. Do not show your answer to anyone else yet.

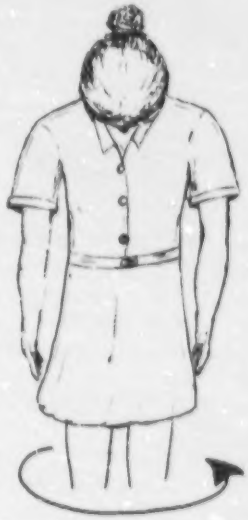
12.3 When everyone has written an answer, compare yours with your friends'. Look again at the picture. Describe anything else that you may now be able to see in it.

12.4 Think of and describe other occasions where your brain <u>concentrates</u> mainly on one thing and takes little notice of others.

12.5 One sense that we often take for granted is our sense of balance. Normally, we do not need to concentrate on balancing, but we can easily upset our balance:

Look down at the floor.
Spin around 20 times.
Now look up.

Describe the sensation you feel in your own words.



12.6 You may have used the word "drunk" in your answer to 12.5.

Drinking alcohol can upset your sense of balance; it can also damage your liver and other parts of your body. It can disturb your concentration, and your brain becomes less able to control what you do.

Describe and try to mime how a drunk person behaves.

12.7 Discuss why it is dangerous to drive after drinking alcohol. Discuss how we could discourage people from drinking and driving.

INSTRUCTIONS FOR THE GAME "DIGESTIVE SNAP AND GRAB"

1. Shuffle your 12 cards with your friend's 12 cards until you have mixed them well.

2. Deal out 12 cards each, face down. Do not look at your cards.

3. The first player takes his top card, and puts it on the table, face up so that both players can see it.

4. The next player places his top card face up on the first card. Each player continues to do this until:

   EITHER

   - your top card is the same as the top card on the table. Then you say "SNAP", take all of the cards on the table, and put them at the bottom of your own cards.

   OR

   - the word on your top card matches the picture on the top card on the table;

   OR

   - the picture on your top card matches the word on the top card on the table;

   THEN you say "GRAB", take all of the cards on the table, and put them at the bottom of your own cards

5. The player who gets all of the cards is the WINNER.

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